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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/648,586	08/26/2003	Efren M. Lacap	408204	4089

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LATHROP & GAGE LC
4845 PEARL EAST CIRCLE
SUITE 300
BOULDER, CO 80301

EXAMINER

JOHNSON, JONATHAN J

ART UNIT	PAPER NUMBER
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1725

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/16/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/648,586

Applicant(s)

LACAP ET AL.

Examiner

Jonathan Johnson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 November 2006.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 and 25-29 is/are pending in the application.
4a) Of the above claim(s) 12-17 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-17, 25-29 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☒ Claim(s) 1-17 and 25-29 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 10-24-05 and 4-25-05 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

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DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-11 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in view of US 6,372,622 (Tan) and US 4,808,274 (Nguyễn). AAPA teaches forming a socket on a first surface of a microchip, such that the socket has predetermined physical dimensions complementary to those of a microchip connection pad footprint occupied by at least one contact pad area on the microchip (fig. 2, item 29), the socket presenting a conductive base capable of bonding to solder; forming a solder layer (figure 2, items 3a, 3b, 3c where the layer comprises discrete units of solder balls) in substantially continuous contact with the conductive base (where the solder is in continuous contact with the conductive base) to place a solder bar (where the examiner interprets the solder ball to be a thin solder bar) in the socket and place the microchip in made-ready condition for installation. (fig. 2, item 3a); wherein the microchip contains a silicon wafer and the step of forming the socket comprises depositing an adhesion layer onto the wafer, and depositing under-bump-metallization (UBM) material contacting the adhesion layer to complete formation of the conductive base (figure 2, items 4, 28 and 29); wherein the step of depositing the adhesion layer includes depositing a conductor selected from the group consisting of aluminum, nickel-vanadium, titanium, tungsten

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and copper (specification, paragraph 7); wherein the step of depositing the UMB material includes depositing a conductor selected from at least one of titanium, tungsten, vanadium, tin, copper, aluminum, gold, silver, and lead (specification, paragraph 8); wherein the step of forming the socket includes the predetermined dimensions selected from the group consisting of rectangular, "E," "L," and "U" shapes (figure 2, side profile of item 29); wherein the step of forming the socket includes the physical dimensions selected from the group consisting of ring, square, and circular shapes (figure 2, top view of item 20a); , wherein the step of forming the socket includes the physical dimensions being complimentary to the solder bar having a planar rectilinear configuration (figure 2, side view of 20A); wherein the step of forming the socket includes the physical dimensions being complimentary to the solder bar having a planar curvilinear configuration (figure 2, top view of 20a); wherein the step of forming the socket includes the physical dimensions being complimentary to the solder bar having a planar curvilinear configuration (figure 2, item 3a); wherein the step of forming the socket further comprising a step of forming a passivation layer on substantially all of the first surface, exclusive of an area where the socket is located (figure 2, item 29); wherein the step of forming the passivation layer includes the steps of: applying one or more layers of passivation material to the entire first surface; and removing selected portions of the passivation material covering the area where the socket is to be located (figure 2, item 29); wherein the step of applying one or more layers of passivation material includes applying at least one layer selected from the group consisting of polysilicon, silicon dioxide, and benzocyclobutane (figure 2, item 28); where the corresponding circuit connection comprises one of a PCB, another chip, and a ceramic interposer (figure 2, items 26 and 1). Tan teaches the interchangeability between a solder ball and a solder

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rectangle (col. 4, ll. 20-30) and where the solder bonds to copper (figure 4, item 30). Nguyen teaches forming including depositing an adhesion layer via a screen printing process (col. 2, ll. 60-67). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the shape of the solder to utilize a rectangle in order to form a reliable electrical connection (see Tan col. 1, ll. 5-55); and to utilize copper as the UBM in order to effectively bond the solder to the substrate (see Tan col. 1, ll. 5-55) and further to modify the combined invention of Tan and AAPA to utilize screen printing in order to reduce the manufacturing costs (see Nguyen col. 2, ll. 50 to col. 3, ll. 25).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA, Tan, and Nguyen as applied to claim 1 above and further in view of US 6,977,396 (Shen). Shen teaches replacing older balls with a solder bar (col. 6, ll. 30-40). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the solder to utilize a solder bar in order to increase the area of interconnect (see Shen col. 6, ll. 30-45).

Claims 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA, Tan, and Nguyen as applied to claim 1 above and further in view of US 2003/0157789 (Tong).

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Tong teaches the adhesion layer can be applied by electroplating and screen printing and the UBM can be applied by sputtering (paragraphs 7 and 32). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the layers to utilize the claimed deposition process in order to ensure the layers are adequately formed (see Tong col. 10-32).

Response to Arguments

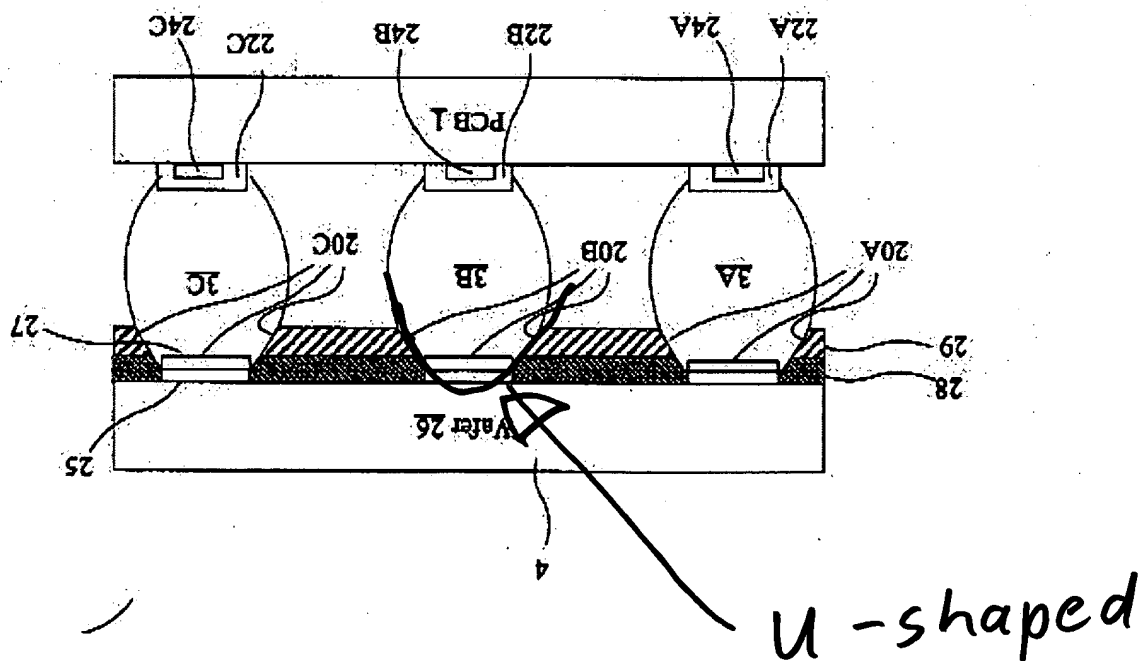
Applicant argues that a solder ball is not a solder bar and cites Webster's Dictionary to support his position. The examiner disagrees. During patent examination, the pending claims must be "given the broadest reasonable interpretation." Applicant always has the opportunity to amend the claims during prosecution, and broad interpretation by the examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified. In re Prater, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969). In the instant case, while applicant's definition is proper, it is the examiner's position that applicant's definition is not the broadest reasonable interpretation. As stated previously, DICTIONARY.COM defines "bar" as "a structural or mechanical member." In applying the Prater test by giving the claims its broadest reasonable interpretation, it is the examiner's position that the solder ball of AAPA could be considered a solder bar because, inter alia, it is a mechanical member that assists in supporting the chip (4) on top of the pcb (1).

Applicant again argues that the figure 2 microchip is "already installed." The examiner agrees. Applicant goes on to argue that it does not meet the claim 1 limitation. The examiner disagrees. During patent examination, the pending claims must be "given the broadest reasonable interpretation." Applicant always has the opportunity to amend the claims during

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prosecution, and broad interpretation by the examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified. In re Prater, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969). In the instant case, AAPA teaches the chip package for use in an electronic product (figure 2, items 4 and 1). It is the examiner's position that the preformed solder bar chip package "makes it ready" for installation in its ultimate use in the electronic product.

Applicant next argues that the connection pad footprint does not have the claimed geometry. The examiner disagrees. A "U" shape is clearly visible from figure 2 (see below).



Conclusion

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Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

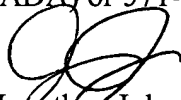
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Johnson whose telephone number is 571-272-1177. The examiner can normally be reached on M-Th 7:30 AM-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Jonathan Johnson
Primary Examiner
Art Unit 1725

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